REMARKS

Applicant respectfully requests further examination and reconsideration in view of the arguments set forth fully below. Claims 1-132 were previously pending. Of the above claims, claims 14-24, 36-46, 58-69 and 71-132 were previously withdrawn from consideration. By the above amendments, claims 133 and 134 are canceled. In the Office Action mailed July 25, 2006, claims 1-13, 25-35, 47-57, 70, and 133-135 have been rejected or alternately withdrawn from consideration. The Applicants respectfully, but strongly, traverse this action for the reasons set forth fully below.

Rejections Under 35 U.S.C. § 102

Within the Office Action, claims 25, 26, 28-35, 47, 48, 50-57, 70, 133, and 134 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent Number 6,119,729 to Oberholzer et al. (hereinafter "Oberholzer"). Applicant respectfully traverses this rejection.

On page 4 of the Office Action, the Examiner disagrees with the Applicant's assertion that the cited structure of Oberholzer is not an enclosure, as claimed in the independent claims 25 and 47. In particular, the Examiner states that the apparatus of Figure 6 (of Oberholzer) is an enclosure and that "Figure 6 is the structure used in the rejection." However, on page 3 of the same Office Action, the Examiner references conduit 12, not the system of Figure 6. The Examiner contends that the fluid begins to freeze on the conduit and advances toward the insert 20, and that this is the same as the claimed limitation "the enclosure is configured to cause a fluid to begin to freeze at one or more locations in the enclosure, and for freezing to advance towards the one or more compressible objects." Comparing the conduit 12 of Oberholzer to the claimed enclosure, as is done by the Examiner, is not appropriate, as it is asserted by the Examiner that the system of Figure 6 of Oberholzer teaches the claimed enclosure. The conduit 12 is only exemplary of those portions of the system in Figure 6 that are exposed to the cold environment.

The system disclosed in the cited portion of Oberholzer has compressible elements in every portion of the system that can be exposed to cold temperature conditions. These portions are first to freeze during exposure to cold temperature conditions.

> Fluid passages between the collector unit 50 and supply line 64 (FIG. 6), including supply manifold 66, and within supply line 64, may be exposed to cold temperature conditions to some extent. The same is true with respect to fluid passages between collector unit 50 and return line 76, including return manifold 74, and within return line 76. In this respect, where such fluid passages are exposed to cold temperature conditions, the corresponding conduit is protected from freeze carnage by the present invention. [Column 8, Lines 46-53]

Thus, the system does not place compressible objects at locations which freeze later. Instead, Oberholzer teaches placing the compressible objects at those locations within the system that are to freeze first.

As applied to the system of Oberholzer, fluid begin to freeze at the exposed portions of the system, which is where the compressed objects are included. Therefore, Oberholzer teaches an enclosure where the fluid begins to freeze where the compressed objects are located. This is not the same as the claimed limitations where fluid begins to freeze at locations in the enclosure other than where the compressed objects are located.

The independent claim 25 is directed to an apparatus for preventing cracking of a liquid system. The apparatus comprises an enclosure; and one or more compressible objects immersed in the enclosure. Further, the enclosure is configured to cause a fluid to begin to freeze at one or more locations in the enclosure, and for freezing to advance towards the one or more compressible objects. As described above, the system of Oberholzer does not disclose or even suggest a mechanism by which a fluid begins to freeze at selected locations, and for freezing to advance towards one or more compressible objects located within the system. For at least these reasons, the independent claim 25 is allowable over the teachings of Oberholzer.

Claims 26 and 28-35 are all dependent on the independent claim 25. As discussed above, the independent claim 25 is allowable over the teachings of Oberholzer. Accordingly, the dependent claims 26 and 28-35 are all also allowable as being dependent on an allowable base claim.

The independent claim 47 is directed to a method of preventing cracking of a liquid system. The system includes one or more pumps and one or more heat exchangers. The method comprises the steps of providing an enclosure; immersing one or more compressible objects in the enclosure; configuring the enclosure to cause a fluid to begin to freeze at one or more locations in the enclosure, and for freezing to advance towards other locations in the enclosure; and immersing one or more compressible objects in the enclosure at the other locations. As described above, the system of Oberholzer does not disclose or even suggest a mechanism by which a fluid begins to freeze at selected locations, and for freezing to advance towards one or more compressible objects located within the system. For at least these reasons, the independent claim 47 is allowable over the teachings of Oberholzer.

Claims 48 and 50-57 are all dependent on the independent claim 47. As discussed above, the independent claim 47 is allowable over the teachings of Oberholzer. Accordingly, the dependent claims 48 and 50-57 are all also allowable as being dependent on an allowable base claim.

The independent claim 70 is directed to an apparatus for preventing cracking of a liquid system. The system includes one or more pumps and one or more heat exchangers. The apparatus comprises an enclosure, wherein the enclosure being capable of contracting and expanding between a minimum volume condition and a maximum volume condition with fluid expansion during freezing, and further wherein the enclosure is configured to cause a fluid to begin to freeze at one or more locations in the enclosure, and for freezing to advance towards other locations in the enclosure. As described above, the system of Oberholzer does not disclose or even suggest a mechanism by which a fluid begins to freeze at selected locations, and for freezing to advance towards one or more compressible objects located within the system. For at least these reasons, the independent claim 70 is allowable over the teachings of Oberholzer.

Rejections Under 35 U.S.C. § 103

Within the Office Action, claims 1-13 and 135 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Oberholzer in view of Japanese Patent No. 10099592 issued to Mihara (hereafter "Mihara"). The Applicant respectfully traverses this rejection for at least the following reasons. The combination of Oberholzer and Mihara does not teach inlet and outlet ports configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger, and for freezing to advance towards the one or more compressible objects, as claimed.

Within the Office Action, it is acknowledged that "Oberholzer et al. do not disclose compressible object coupled to the inlet and outlet ports which configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger, and freezing to advance towards the one or more compressible objects." The Examiner cites Mihara as disclosing that the compressible object should be located "at the latest freezing location" in the heat exchanger of Oberholzer. The Applicant respectfully disagrees with the Examiner's interpretation of the teachings of Mihara. In particular, Mihara teaches that a hollow object (compressible object) is positioned in a center section of a water storage area because the "icy formation of the center section of the storage-of-water section is slow" (emphasis added) (Mihara, paragraph [0009], English language translation). Clearly, "slow" ice formation at one location is a relative observation as compared to other locations; however, it is not an absolute indication that the center section is the "latest" freezing location, as asserted by the Examiner. As such, it can not be concluded that freezing of the fluid advances toward the center section, since other sections may cool at an even slower rate.

Further, even if positioning the hollow object does advance freezing of the fluid toward the hollow object, which the Applicant does not agree is the case, the combination of Oberholzer and Mihara does not teach the limitations as claimed. Specifically, the independent claim 1 includes the limitation "the heat exchanger is configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger, and for freezing to advance towards the one or more compressible objects" (emphasis added). Mihara merely teaches taking advantage of a pre-existing slow freezing point. In other words, the pump of Mihara is determined to have a "slow" freezing point at the center of the water storage area, and the hollow object is then positioned at this point. Mihara does not teach that the actual pump is configured, e.g. designed, so that the center of the storage area freezes slowly. Mihara teaches positioning the hollow object at an opportune location, e.g. the center of the water storage area. Mihara does not teach designing the actual position of the opportune location. In contrast, the claimed heat exchanger is specifically configured for freezing to advance towards the compressible objects, and the heat exchanger is specifically configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger. For example, the heat exchanger of Figure 7A is configured such that freezing begins at the microchannels 138 and advances towards the inlet port 131 and the outlet port 135, as is explained in detail in the Appeal Brief. As such, Mihara does not teach the claimed limitations as asserted by the Examiner. Accordingly, the combination of Oberholzer and Mihara does not teach the claimed limitation of a heat exchanger configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger, and for freezing to advance towards the one or more compressible objects.

The independent claim 1 is directed to an apparatus for preventing cracking of a liquid system. The apparatus includes at least one heat exchanger; at least one inlet port extending through a first opening for conveying a fluid to a plurality of channels and passages; at least one outlet port extending through a second opening for discharging the fluid from the plurality of channels and passages; and one or more compressible objects coupled to the inlet and outlet ports in an unpressured condition such that the compressible objects reduce a volume of the inlet port and the outlet port and further wherein pressure exerted on the compressible object increases a volume of the inlet port and the outlet port; wherein, the heat exchanger is configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger, and for freezing to advance towards the one or more compressible objects. As described above, it is acknowledged that Oberholzer does not teach a heat exchanger configured so that the fluid in the inlet port and the outlet port freezes later than the fluid

elsewhere in the heat exchanger, and for freezing to advance towards the one or more compressible objects. As also described above, the cited portion of Mihara does not teach that the heat exchanger is configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger, and for freezing to advance towards the one or more compressible objects. Therefore, the proposed combination of Oberholzer in view of Mihara does not teach the claimed limitations. For at least these reasons, the independent claim 1 is allowable over the combination of Oberholzer in view of Mihara.

Claims 2-13 are all dependent on the independent Claim 1. As discussed above, the independent claim 1 is allowable over the combination of Oberholzer in view of Mihara. Accordingly, the dependent claims 2-13 are all also allowable as being dependent on an allowable base claim.

The independent claim 135 is directed to an apparatus for preventing cracking of a liquid system. The apparatus includes at least one heat exchanger including a plurality of microchannels, at least one inlet port extending through a first opening for conveying a fluid to the plurality of microchannels, at least one outlet port extending through a second opening for discharging the fluid from the plurality of microchannels, and one or more compressible objects each coupled to at least one of the inlet port and outlet port in an unpressured condition such that the compressible objects reduce a volume of the inlet port and the outlet port and further wherein pressure exerted on the compressible object increases a volume of the inlet port and the outlet port, wherein the heat exchanger is configured so that fluid within the plurality of microchannels freezes before fluid within the outlet port and the inlet port. As described above, it is acknowledged that Oberholzer does not teach a heat exchanger configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger. As also described above, the cited portion of Mihara does not teach that the heat exchanger is configured so that the fluid in the inlet port and the outlet port freezes later than the fluid elsewhere in the heat exchanger. Therefore, the proposed combination of Oberholzer in view of Mihara does not teach the claimed limitations. For at least these reasons, the independent claim 135 is allowable over the combination of Oberholzer in view of Mihara.

Within the Office Action, claims 27 and 49 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Oberholzer in view of Mihara. Claim 27 is dependent on the independent claim 25. Claim 49 is dependent on the independent claim 47. As discussed above, the independent claims 25 and 47 are allowable. Accordingly, the dependent claims 27 and 49 are each also allowable as being dependent on an allowable base claim.

For the reasons given above, Applicant respectfully submits that the claims are now in a condition for allowance, and allowance at an early date would be appreciated. Should the Examiner have any questions or comments, the Examiner is encouraged to call the undersigned at (408) 530-9700 to discuss the same so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
HAVERSTOCK & OWENS LLP

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